[0044] CLAIMS

1. An optical signal interface comprising:

a first input port for receiving a first data stream at a first rate;

a second input port for receiving a second data stream at a second rate, wherein said second rate is different than said first rate;

a first processing branch for receiving said first data stream, said first processing branch including:

a demultiplexer for dividing said first data stream into a plurality of third data streams at a third rate which is less than said first rate;

a forward error correction (FEC) unit for adding a forward error correction code to each of said plurality of third data streams to generate FEC encoded data streams; and

a multiplexer for combining said FEC encoded data streams to output a composite FEC encoded data stream at substantially said first rate; and

a second processing branch for receiving said second data stream, said second processing branch including:

a demultiplexer for dividing said second data stream into a plurality of fourth data streams at a fourth rate which is less than said second rate;

a forward error correction (FEC) unit for adding a forward error correction code to each of said plurality of fourth data streams to generate FEC encoded data streams; and

a multiplexer for combining said FEC encoded data streams to output a composite FEC encoded data stream at substantially said first rate.

2. The interface of claim 1, wherein said first rate is OC192 and said second rate is OC768.

3. The interface of claim 2, wherein said forward error correction unit in said second processing branch includes a plurality of forward error correction units that share a common clock.

4. The interface of claim 1, wherein said third rate and said fourth rate are equal.

5. The interface of claim 1, further comprising at least one optical switch for selectively connecting said first input port with said first processing branch and said second input port with said second processing branch.

6. The interface of claim 1, further comprising an optical cross-connect for selectively connecting said first input port with said first processing branch and said second input port with said second processing branch.

7. The interface of claim 1, wherein said third rate is 622 Mbps.

8. The interface of claim 1, wherein said demultiplexer in said second processing branch includes a plurality of demultiplexing stages.

9. An optical signal interface comprising:

a first receive processing branch for receiving a first data stream at substantially a first data rate, said receive processing branch including:

a demultiplexer for dividing said first data stream into a plurality of second data streams;

a forward error correction (FEC) unit for removing a forward error correction code associated with each of said second data streams to generate FEC decoded data streams; and

a multiplexer for combining said FEC decoded data streams to output a composite FEC decoded data stream at said first data rate; and

a group of second receive processing branches, which receives a plurality of third data streams at substantially said first data rate, and includes:

a demultiplexer for dividing a respective third data stream into a plurality of fourth data streams;

a forward error correction (FEC) unit for removing a forward error correction code associated with each of said fourth data streams to generate FEC decoded data streams; and

a multiplexer for combining said FEC decoded data streams to output a composite FEC decoded data stream at a second data rate greater than said first data rate.

10. The interface of claim 9, wherein said first rate is OC192 and said second rate is OC768.

11. The interface of claim 10, wherein said group of second receive processing branches includes four branches.

12. The interface of claim 9, wherein said FEC unit in said group of second receive processing branches includes a plurality of FEC units that share a common clock.

13. The interface of claim 9, wherein said second data streams and said fourth data streams have the same data rate.

14. The interface of claim 9, further comprising at least one optical switch for selectively connecting an output of said first receive processing branch with a respective first output and an output of said group of second receive processing branches with a respective second output port

15. The interface of claim 9, further comprising an optical cross-connect for selectively connecting an output of said first receive processing branch with a respective first output and an output of said group of second receive processing branches with a respective second output port

16. The interface of claim 9, wherein said demultiplexer in said second processing branch includes a plurality of demultiplexing stages.

17. The interface of claim 9, wherein said group of second receive processing branches further comprises:

means for aligning said plurality of third data streams in time.

18. The interface of claim 17, wherein said means for aligning said plurality of third data streams in time is a logic unit which is connected to said FEC unit.

19. The interface of claim 18, wherein said logic unit is one of a field programmable gate array (FPGA) and a digital signal processor (DSP).

20. An optical communication system comprising:

at least two terminal units connected to one another by at least one optical fiber;

a plurality of line units connected to said at least one optical fiber for amplifying optical signals propagating therethrough; and

an interface, connected to each of said at least two terminal units, adapted to process optical data streams at both a first rate and a second rate different than said first rate .

21. The optical communication system of claim 20, wherein said first rate is OC192 and said second rate is OC768.

22. The optical communication system of claim 21, wherein said interface has at least one OC 192 input and at least one OC768 input.

23. The optical communication system of claim 21, wherein said interface has only OC768 inputs and OC192 outputs.

24. The optical communication system of claim 20, wherein one of said first rate and said second rate is OC48.

25. The optical communication system of claim 21, wherein said OC192 data streams carry data at a rate of about 10 Gb/s and said OC 768 data streams carry data at a rate of about 40 Gb/s.

26. The optical communication system of claim 20, wherein said interface includes means for aligning a plurality of data streams in time, which data streams are subsequently combined to form said data streams of said second rate.

27. The interface of claim 26, wherein said means for aligning said plurality of data streams in time is a logic unit which is connected to a forward error correction (FEC) unit.

28. The interface of claim 27, wherein said logic unit is one of a field programmable gate array (FPGA) and a digital signal processor (DSP).

29. The interface of claim 20, wherein said interface includes at least one optical switch for switching said first rate data streams and said second rate data streams into different branches of said interface.

30. The interface of claim 20, wherein said interface includes at least one optical switch for switching said first rate data streams and said second rate data streams out of different branches of said interface.

31. The interface of claim 20, wherein a first plurality of WDM channels are allocated for handling said first rate data streams and a second plurality of WDM channels are allocated for handling said second rate data streams.

32. The interface of claim 31, wherein said first and second plurality of channels are fixed.

33. The interface of claim 31, wherein said first and second plurality of channels are variable.

34. A method for interfacing optical communication systems comprising the steps of:

receiving, from a first optical communication system, a data stream at a first rate;

providing said data stream to a processing branch associated with said first rate;

dividing, in said processing branch, said data stream into a plurality of slower data streams;

encoding each of said plurality of slower data streams;

combining said encoded, slower data streams into a composite data stream; and

transmitting said composite data stream over a second optical communication system at a second rate which is different than said first rate.

35. The method of claim 34, wherein said step of providing further comprises the step of:

switching said data stream to said associated processing branch using one of an optical switch and an optical cross-connect.

36. The method of claim 34, wherein said step of encoding further comprises the step of:

synchronizing the encoding of each of said plurality of slower data streams.

37. The method of claim 34, wherein said first optical communication system is a terrestrial optical communication system and said second optical communication system is a submarine optical communication system.

38. The method of claim 34, wherein said first rate is OC768 and said second rate is substantially OC192.

39. The method of claim 34, wherein said first rate is OC48 and said second rate is substantially OC192.

40. A method for interfacing optical communication systems comprising the steps of:

receiving, from a first optical communication system, an OC768 data stream over a plurality of wave division multiplexed (WDM) channels;

forward error correction (FEC) decoding and time aligning said plurality of WDM channels;

combining said decoded, time aligned WDM channels into said OC768 data stream; and

transmitting said OC768 data stream over a second optical communication system.

41. The method of claim 40, wherein said first optical communication system is a submarine optical communication system and said second optical communication system is a terrestrial optical communication system.

42. The method of claim 40, wherein said step of time aligning further comprises the steps of:

identifying frame boundaries within each of said plurality of WDM channels; and

selectively advancing or retarding data within one or more of said plurality of WDM channels to time align said frame boundaries.

43. The system of claim 20, further comprising:

a mesh network protection architecture scheme.

44. The system of claim 20, further comprising:

a 1+1 network protection architecture scheme.

45. The system of claim 20, further comprising:

a 1:N network protection architecture scheme.

46. An interface for an optical communication system comprising:

an optical cross-connect having a plurality of inputs thereto, said inputs including:

a first set of data streams at a first rate;

a second set of data streams at a second rate;

a third set of data streams at a third rate, wherein said first, second and third rates are each different;

a plurality of first processing branches connected to said optical cross-connect;

a plurality of second processing branches connected to said optical cross-connect; and

a plurality of third processing branches connected to said optical cross-connect;

wherein said optical cross-connect selectively transfers said first second and third sets of data streams to a respective one of said first, second and third processing branches.

47. The interface of claim 46, wherein said first set of data streams at a first rate is a single OC768 data stream.

48. The interface of claim 46, wherein said second set of data streams at a second rate is a single OC192 data stream.

49. The interface of claim 46, wherein said third set of data streams at a third rate is four OC48 data streams.

50. The interface of claim 47, wherein said first processing branch demultiplexes said first set of data streams to a plurality of data streams at a fourth data rate, adds error correction coding to each of said data streams at said fourth data rate to generate a plurality of composite data streams and multiplexes said composite data streams into a plurality of data streams at a fifth rate.

51. The interface of claim 50, wherein said plurality of data streams at said fifth rate are treated as a logical group for switching.

52. The interface of claim 50, wherein said plurality of data streams at said fifth rate are transmitted over a same optical fiber.

53. The interface of claim 50, wherein said first processing branch includes two demultiplexing stages.

54. The interface of claim 50, wherein said fourth data rate is 622 Mbps and said fifth data rate is approximately 11.5 Gb/s.

55. The interface of claim 47, wherein said second processing branch demultiplexes said second set of data streams to a plurality of data streams at a fourth data rate, adds error correction coding to each of said data streams at said fourth data rate to generate a plurality of composite data streams and multiplexes said composite data streams into a single data stream at a fifth rate.

56. The interface of claim 55, wherein said fourth data rate is 622 Mbps and said fifth data rate is approximately 11.5 Gb/s.

57. The interface of claim 47, wherein said third processing branch demultiplexes said third set of data streams to a plurality of data streams at a fourth data rate, adds error correction coding to each of said data streams

at said fourth data rate to generate a plurality of composite data streams and multiplexes said composite data streams into a single data stream at a fifth rate.

58. The interface of claim 57, wherein said fourth data rate is 622 Mbps and said fifth data rate is approximately 11.5 Gb/s.

59. The interface of claim 31, wherein a group of said second plurality of WDM channels are assigned to handle each of said second rate data streams.

60. The interface of claim 59, wherein said group of WDM channels are transmitted over a same optical fiber.

61. The interface of claim 59, wherein said group of WDM channels are handled as a single logical entity for network protection schemes.